CASE REPORT – OPEN ACCESS

International Journal of Surgery Case Reports 3 (2012) 49–51

Contents lists available at SciVerse ScienceDirect

International Journal of Surgery Case Reports

journal homepage: www.elsevier.com/locate/ijscr

Mediastinal mature teratoma in a Jehovah's Witness: Discrepancy between imaging and intraoperative findings

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ARTICLE INFO

Article history:
Received 23 February 2011
Accepted 21 October 2011
Available online 31 October 2011

Key words:
Mediastinal mass
Mature teratoma

ABSTRACT

INTRODUCTION: Primary mediastinal germ cell tumors are exceedingly rare but may present with a wide spectrum of elements. The occasional mediastinal teratoma that presents completely comprised of mature elements is a benign tumor but the appearance on imaging studies may be more suggestive of an invasive tumor. The treatment is complete resection but the assessment of resectability based on computed tomographic imaging can be misleading.
PRESENTATION OF CASE: We present a case of a 26 year old female, Jehovah's Witness who presented with a symptomatic mediastinal mass that on CT scan appeared to be unresectable due to presumed invasion of adjacent structures including the left pulmonary artery. Surgical exploration revealed an encapsulated, completely resectable mass which was excised without difficulty. Her early postoperative course was uneventful and at 18 months follow up is doing well without evidence of recurrence.
DISCUSSION: The treatment of mature teratoma is complete surgical excision but the imaging studies may at times be misleading. We believe this case presents a unique clinical situation, since mediastinal mature teratomas are very rare and in addition, the preoperative decision to excise a mass becomes more complex in a case of a Jehovah's Witness. This case illustrates that the CT findings may be misleading when assessing a mediastinal mass.
CONCLUSION: Resectability of a mediastinal mass can only be assessed at the time of operation and rarely should operation be denied solely on the basis of findings on imaging. Thus in these primary mediastinal tumors there should be a low threshold for proceeding with operation.

1. Case presentation

A 26-year-old Jehovah's Witness presented with a 3-week history of progressive dypsnea on exertion and chest pain. Chest radiograph (Fig. 1A) revealed an 18 cm mass in the anterior mediastinum. Computed tomographic (CT) scan showed a large mediastinal mass extending into the left hemithorax with loss of the normal tissue plane between the mass, the innominate vein, the left pulmonary artery, the left pulmonary vein, the aortic arch and the pericardium (Figs. 1B and 2). Fine needle aspiration of the mass showed a presumed teratoma comprised only of mature elements. Tumor markers including AFP (alpha-fetoprotein), beta -HCG (human beta-choriogonadotropin) and LDH (lactate dehydrogenase), were within normal limits. The Hematocrit level was 33.0. Some consideration was given to the administration of preoperative neoadjuvant chemotherapy based on the imaging findings but ultimately decided against due to the presence only of mature elements. The risks of the procedure were discussed with the patient specifically the possibility of blood loss based on the imaging findings. She agreed to proceed with operation with the proviso that her religious preference be respected and no blood transfusions be given.

2. Procedure and the intraoperative findings

A median sternotomy was performed and a large mediastinal mass was identified that appeared encapsulated and non-invasive. The tumor traversed the pericardium between the two phrenic nerves, abutted the innominate vein and the aortic arch without any evidence of invasion and compressed two-thirds of the superior part of the pericardium and was adherent to the left lower lobe of the lung. The pericardium was entered inferiorly and excised with the mass along with a wedge of the left lower lobe. There was no evidence of invasion of the innominate vein, pulmonary artery, aortic arch or the pulmonary vein as the tumor was sharply

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doi:10.1016/j.ijscr.2011.10.010

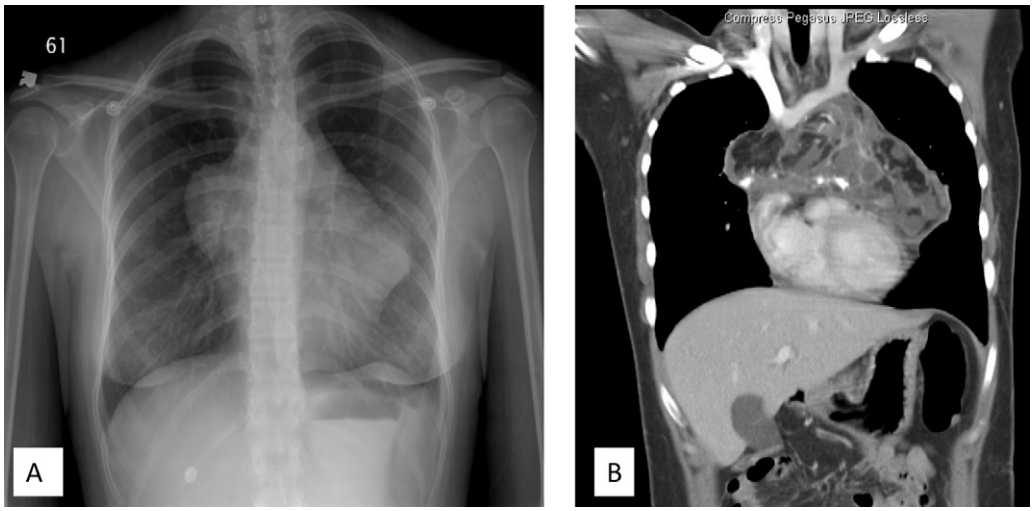

Fig. 1. Mediastinal mass on CXR (A) and coronal view on CT scan with appearance of involving the heart and the innominate vein. (B.)

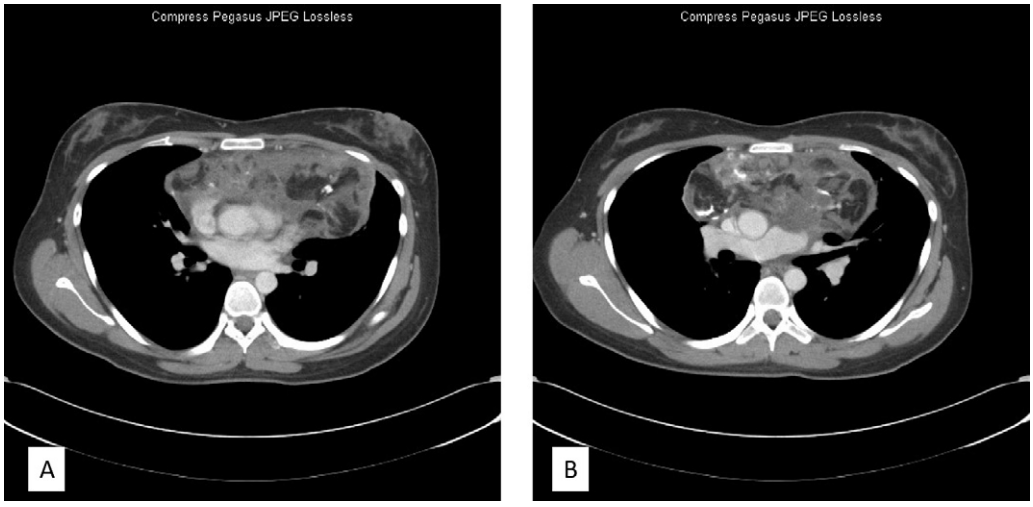

Fig. 2. Mediastinal mass on sagittal view on CT scan: with appearance of invasion of the left pulmonary vein (A) the aorta and the left pulmonary artery (B).

dissected away from these structures. The estimated blood loss was less than 50 mL. The patient tolerated the procedure well without any complications and was extubated in the operating room.

3. Specimen

3.1. Gross description

The specimen consisted of a 432 g, 17.0 cm × 8.5 cm × 6.0 cm ovoid soft tissues mass with attached 6.0 cm × 5.5 cm × 3.0 cm lung wedge, 4.0 × 3.0 × 1.5 thymus gland, and pericardium. The mass was well circumscribed with a variegated appearance including cystic areas filled with sebaceous material and hair, yellow adipose tissue, tan skin, gray-white dense fibrous tissue (2.0 cm × 2.0 cm × 1.5 cm) cartilage and focal calcified areas of possible bone formation (Fig. 3). There were no areas of hemorrhage or necrosis. The mass did not involve the thymus gland. A thick fibrous capsule separated the adherent lung tissue and the mass. The mass did not involve the surrounding pseudo capsule or the pericardium.

3.2. Microscopic description

The tumor was composed of entirely mature elements including ectodermal components (skin and mature neural tissue), endodermal components (respiratory and gastrointestinal mucosa, and pancreatic tissue), and mesenchymal components (adipose tissue, smooth muscle, cartilage, bone and bone marrow) (Fig. 4). Dense fibrous adhesions were present between the tumor and the adjacent lung parenchyma, thymus gland and the pericardium. The tumor appeared to involve the visceral pleura but was not invading lung parenchyma.

4. Discussion

Mediastinal germ cell tumors are exceedingly rare lesions and are classified as benign or malignant. Benign tumors include teratomas with only mature elements as well as teratomas with immature components comprising less than fifty percent of the lesion.[1] Histologically teratomas may present as either solid or cystic. The majority of mediastinal teratomas are composed of mature ectodermal, mesodermal, and endodermal elements and

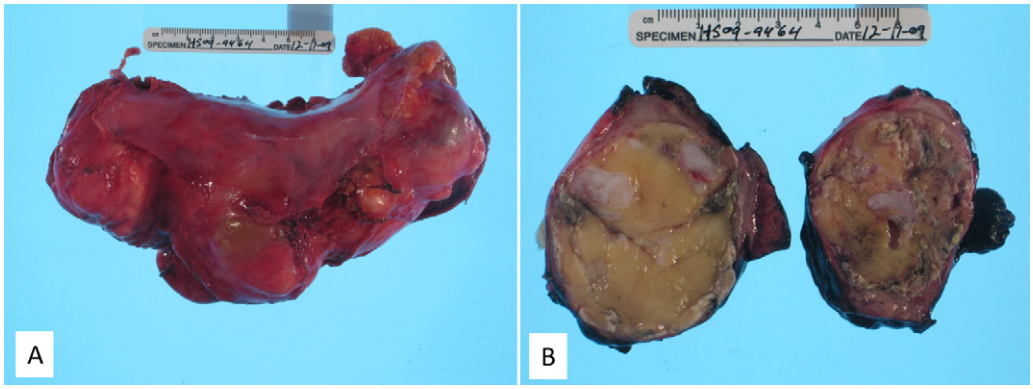

Fig. 3. Mature teratoma, a well circumscribed mass 17 cm in greatest dimension, with a variegated appearance including cystic areas (A), filled with sebaceous material and hair, yellow adipose tissue, tan skin, gray-white dense fibrous tissue, cartilage and focal calcified areas of possible bone formation (B).

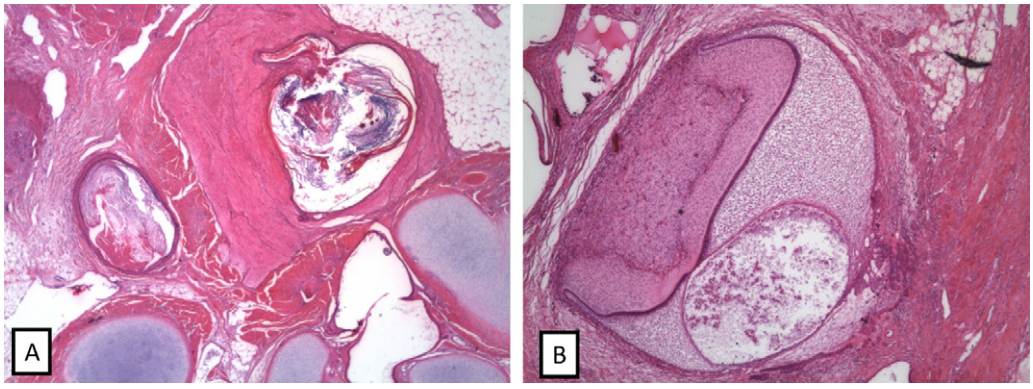

Fig. 4. (A) H&E stained slide on low power magnification show mature teratoma with skin and mature neural tissue, adipose tissue, muscle, and cartilage. (B) H&E stained slide on low power magnification show dental papilla with dentigerous epithelium.

exhibit a benign course.[2] Determination of serum tumor markers (alpha-fetoprotein AFP and human beta-choriogonadotropin HCG) is important in the diagnosis and follow-up of mediastinal germ cell tumors. As distinct from immature or malignant teratomas patients with benign teratomas do not exhibit elevated tumor markers.

For mature teratomas complete surgical excision most commonly is associated with cure and the incidence of local recurrence approaches zero.[3] For immature or malignant teratomas treatment consists either of primary resection followed by chemotherapy or preoperative chemotherapy followed by operation.[4,5]

Computed tomographic scan with intravenous contrast is the definitive diagnostic study to assess the extent of the tumor but the imaging studies may at times be misleading, as they can be with any mediastinal mass. In the present case the imaging studies raised the question of unresectability based primarily on the possible invasion of the mass into the left pulmonary artery. Further complicating this particular case was the patient's religious beliefs that precluded blood transfusion. At the time of exploration the mass was found to be encapsulated and was readily removed. The patient had an uneventful postoperative course and was discharged from the hospital without any complications.

This case illustrates that the CT findings may be misleading when assessing a mediastinal mass. Thus in these primary mediastinal tumors there should be a low threshold for proceeding with operation and attempted resection especially when tumor markers are not elevated. Resectability of a mediastinal mass can only be assessed at the time of operation and rarely should operation be denied solely on the basis of findings on imaging.

Conflict of interest

None.

Funding

None.

Ethical approval

Obtained.

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